

**THE SPECTRUM AND SHORT-TERM OUTCOME OF HOME-
BASED INJURIES AMONG CHILDREN PRESENTING TO
KENYATTA NATIONAL HOSPITAL**

BY:

DR PATRICK .M. MBURUGU

SUPERVISORS:

DR. DANIEL NJAI

PROF. E.MALECHE- OBIMBO

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This research dissertation is submitted in partial fulfillment for award of degree of Master of
Medicine (Paediatrics and Child Health) in the University of Nairobi

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Declaration

I declare that this dissertation is my original work and has not been presented for the award of a degree in any other university.

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Dr Patrick. M. Mburugu. MBChB.

Masters in Medicine student. Department of Paediatrics and Child Health

University of Nairobi

This dissertation is submitted for examination with our full approval as university supervisors:

Signed...../tyrrtLf^diA:

Date...1/11/2011

Dr Daniel Njai. MBChB. MMed.

Senior Lecturer. Department of Paediatrics and Child Health

University of Nairobi

Prof. Elizabeth Maleche Obimbo. MBChB. MMed. MPH.

Associate Professor, Department of Paediatrics and Child Health

University of Nairobi

Dedication

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I would like to express my sincere appreciation to:

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List of abbreviations

A&E	Accident and Emergency
CDC	Centre for Disease Control
EAMJ	East African Medical Journal
KMTC	Kenya Medical Training College
KNH	Kenyatta National Hospital
KSh	Kenya Shillings
MMED	Master of Medicine
PEU	Paediatric Emergency Unit
UNICEF	United Nations Children's Fund
USA	United States of America
WHO	World Health Organisation

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1.0 INTRODUCTION

Accidents in children constitute a major public health concern. As the burden of infection slowly declines in low income countries, the proportion of non infectious disease conditions such as injuries, cancer, asthma, as well as cardiovascular, renal, dermatologic and endocrine diseases increases. This epidemiological transition has been noted in countries such as Thailand ¹, China ² and Mexico ³ but is also present in Africa.

The United Nations Convention on the Rights of the Child ratified by almost all governments, including the Kenyan government, states that children have a right to a safe environment and to protection from injury and violence. The convention stresses the responsibilities of society to protect children and provide them with appropriate support services. It states further that children have a right to the highest attainable level of health and the right to a safe environment free from injury and violence⁴.

In order to achieve the fourth millennium development goal which is to reduce the under five mortality rate by two thirds. United Nations member states need to include injury prevention in their programmes. Among children aged between 1-4 years, injuries account for approximately 6% of all deaths⁵.

Most injuries, especially among younger children, occur in the home, the place where children spend most of their time ⁶. The range of potential hazards in the home is vast and the exposure to these varies as a child develops.

2.0 BACKGROUND AND LITERATURE REVIEW

Definition of Injury

Injury will be defined as the physical damage that results when a human body is suddenly or briefly subjected to intolerable levels of energy. It can be a bodily lesion resulting from acute exposure to energy in amounts that exceed the threshold of physiological tolerance, or it can be an impairment of function resulting from a lack of one or more vital elements (i.e. water, air, warmth), as in drowning, strangulation or freezing¹⁰.

Epidemiology

Undeniably, accidents in children are an important cause of morbidity and mortality all over the world. The World Health Organisation (WHO) estimated that in 2004, around 830,000 children under the age of 18 years died as a result of unintentional injury'. More than 95% of injury deaths among children and adolescents occur in low income and middle income countries⁷. Unintentional injuries are the leading cause of death for children over 9 years . Tens of millions more children are non-fatally injured and many of these require hospital treatment.

The WHO estimated that in 2004, around 212,031 children under the age of 12 years died of unintentional injuries in Africa alone, 25% of these deaths being children in the age group 1-4 years. Every year, nearly 42,000 children and teenagers aged 0-19 years die from unintentional injuries in the European region, where injuries are the leading cause of death in children and adolescents aged 5-19 years; 5 out of 6 of these deaths occur in low and middle income countries⁸.

In the United States, injuries continue to be the leading cause of death among children. Among those aged 1-19 years, 44% of all deaths are due to unintentional injuries. Approximately 9.2 million non fatal injuries are treated in the emergency department each year among children aged 1-19 years in the United States[^]. From 1992 to 1999 there was an average of 146,970 deaths from injuries in the USA, and 20% of these injuries occurred at home. Among children under 14 years of age, there were, on average, 2,096 deaths from household unintentional injuries¹⁰.

Waisman et al. studied accident patients aged 0 to 14 years and found out that 51.9% of injuries took place at home and that the younger the child, the higher the frequency of household injuries". In Canada, 65.6% of falls involving individuals up to 19 years of age occurred at home and needed hospital treatment; this rate increased to 92.3% among infants (up to one year of life)¹².

Accidental Injuries

Burns and electric shocks, inhalation and choking, and drowning are the main causes of household unintentional injuries among individuals less than 15 years in the USA. In the first year of life, choking and aspiration are the major causes of death; thereafter, burns and electric shock are the main killers^{1j}.

In a study done by Mwaura et al in an urban community in Nairobi Kenya in 1994. burns and open wounds constituted 62% of all types of domestic injuries. Burns occurred more frequently among children 0-9 years (85%) whilst open wounds occurred more frequently in the age group 5-14 years (67.8%)¹⁴. Similarly a study performed in Malawi also showed burns to be a major contributor to morbidity, they accounting for 27.3% of all hospital admissions

A complex association between social deprivation and increased risks of childhood injury has been noted in many previous studies. The factors underlying this association include: overcrowded housing conditions, hazardous environments, single-parenthood, unemployment, a relatively young maternal age, relatively low level of maternal education, stress and mental health problems on the part of caregivers and lack of access to health care^{16,6,7}.

Falls

Locally, Makewa et al. in a study of patterns of childhood accidental physical injuries at Kenvatta National Hospital found that falls were the commonest type of accident and they accounted for 45.7% of all accidental injuries¹⁷. In a community based study in Baringo Kenya, falls accounted for 27% of all accidents¹⁸. In most countries, falls are the most common type of childhood injury seen in emergency departments, accounting for between 25% and 52% of assessments¹⁵.

From 0 to 2 months of life, falls are due to accidental dropping of the infant by an older individual: and between 3 and 11 months of life, falls from pieces of furniture are common.¹⁹ Falls from windows are predominant among under-five year- old male patients, possibly because these children are constantly impulsive, and lack the ability to recognize danger in a concrete manner²⁰.

Burns

Overall, children are at a high risk of death from burns, with a global rate of 3.9 deaths per 100,000 population, with infants having the highest death rates from burns⁷. According to W.H.O data, approximately 10% of all unintentional injury deaths are due to fire related burns .

Globally, nearly 96,000 children and young people under the age of 20 years were estimated to have been fatally injured as a result of a fire-related burn in 2004. The death rate in low-income and middle-income countries was 4.3 per 100,000 population, eleven times higher than the 0.4 per 100,000 population in high-income countries⁷.

Here in Kenya, 48.6% of children presenting with burns at the Kenyatta National Hospital were under the age of five years, with most of the burns taking place at home²¹. In Maiduguri, north-east Nigeria, the commonest cause of burns was scalds (64.4%). Children under the age of three years were disproportionately represented".

Most studies suggest that burns among young children occur most frequently in the home while, among older children most of the burns occur in the workplace. A study in four low-income countries found that 65% of childhood burns had occurred in and around the home¹.

Some children are more vulnerable to burns than others. The incidence of burn injuries is significantly higher among the disabled children than among the non-disabled children". Although not specific to children, those who suffer from uncontrolled epilepsy appear to be at a greater risk for burn injuries. Such injuries are often severe enough to require admission in hospitals²⁴.

A number of case-control and descriptive studies conducted in different parts of the world have identified several socioeconomic factors that increase the risk of childhood burns²⁶⁻²⁷. These factors include: a low rate of literacy within the family; living in overcrowded dwellings; a failure of proper supervision of children; a history of burns among siblings; the absence of laws and regulations relating to building codes, smoke detectors and flammable clothing.

The long-term consequences and the disability that can result from burns, place a considerable strain on individuals and their families as well as on health-care facilities'.

Poisoning

The home and its surroundings can be dangerous places for children, particularly for the possibility of unintentional poisoning. The natural curiosity of the children, leads them to explore in and around the home with increased risk to poisoning. *"All things are poison and nothing is without poison. only the dose permits something not to be poisonous"* in this context implies that all substances including drugs, that are meant for good intentions can turn to be poison if consumed in large doses.

Acute poisoning accounted for an estimated 45. 000 deaths annually in children and young people under the age of 20 years in 2004¹. The global death rate from poisonings among children and young people under 20 years of age is 1.8 per 100. 000 population. In the high-income countries, the rate of poisoning among children is 0.5 per 100. 000 population while in the low-income and middle income countries the rate is four times higher, at 2.0 per 100. 000 population⁷. In low-income and middle-income countries, the rate of fatal poisoning is highest among children under the age of one year. Generally, mortality rates decrease with age until 14 years. Almost everywhere, mortality rates increase again among the children from 15 years of age. In many settings, this increase is due to substance abuse, or to unintentional or undetermined drug overdoses⁷.

Rangel et al. studied 609 poisoning among patients aged 0 to 14 years and showed that 98.7% of the poisonings took place at home.¹¹ 53% of these poisonings involved children between 0 and 4 year, 58.2% of these patients being boys²⁴.

A study conducted in Bangladesh, Colombia, Egypt and Pakistan showed that medications were responsible for 31% of poisonings in children under 12 years of age, followed by cleaning agents, which accounted for 20% of the poisonings in children⁰. A hospital-based study from United Arab Emirates found that 55% of childhood poisonings were due to medicines. Analgesics, non-steroidal anti-inflammatory drugs and antihistamines were the most commonly ingested drugs in children in the 1-5 year age group¹.

Ingestion of hydrocarbon fuel used for cooking, heating or lighting is a common cause of childhood poisoning in low-income countries^{3-34, 5}. Paraffin oil is the leading cause of childhood poisonings in many countries, where it may account for up to 16% of all paediatric poisonings, mainly in children aged between 1 and 5 years⁶. Mwaura et al in a study that focused on childhood accidents in Nairobi found that cases of poisoning were most prevalent in the middle income households and in the age group 0-4 years¹⁴.

Several case-control studies in low-income and middle-income countries have highlighted the social and demographic risk factors in the poisoning among children. These factors include the presence of young parents, residential mobility, limited adult supervision, poor living conditions, and ignorance of the danger of chemicals, delegation of care (another child, grand parent) and previous poisoning⁷. Although parents and caregivers may have been present at the time of the poisoning incident, studies confirm that they were usually engaged in household duties or attending to personal needs.

Drowning

According to the WHO Global Burden of Disease estimates, totally 388.000 people died in 2004 as a result of drowning with 45% of these deaths occurring among individuals under the age of 10 years⁷. Fatal drowning was the thirteenth cause of death among children under 15 years of age. The overall global death rate from drowning among children is 7.2 deaths per 100.000 population, though with significant regional variations. The death rate from drowning in low-income and middle-income countries is six times higher than in high-income countries, with rates of 7.8 per 100.000 and 1.2 per 100.000 respectively. In the year 2004, approximately 175.000 children and youth under the age of 20 years died of drowning around the world. The overwhelming majority, 98.1% of these deaths, occurred in low-income and middle-income countries¹.

Patterns of child drowning across countries generally reflect the type of water to which the child is exposed. In low-income and middle-income countries, most deaths from drowning happen during daily activities that involves playing, working, and washing, collecting water and crossing water - for instance, to reach school. The bodies of water involved include ponds, ditches, lakes, rivers and water collecting systems.¹⁴ By contrast, in high-income countries, most childhood drowning occurs in recreational settings. In general, most children drown in or around the home. The younger the child, the closer to home is the event likely to occur. For young children in high-income countries, the presence of a residential pool, particularly one that is inadequately fenced, is the strongest risk factor⁴⁰ while in many low-income countries, the presence of open bodies of water or a well is strongly related to the risk of drowning.

In a study carried out in Bangladesh, most of deaths from drowning among children aged 12-23 months occurred in ditches and ponds, the water sources to which the children were exposed.⁴¹

Worldwide the highest rates of drowning occur among children under the age of five years, the peak occurring in the age groups 1-4 years. In late adolescence, another peak is seen. This pattern is generally consistent across the world. The likely explanation for these peaks is related to developmental processes in young children and experimentation among adolescents, especially with substances such as alcohol⁷.

For those children who survive drowning, many are left with long-term consequences and disabilities that create enormous difficulties for families, with prohibitively high costs of health care⁷.

Non Accidental Injuries

Non accidental injuries to children include hitting, shaking, throwing, poisoning, burning or scalding, drowning, suffocating and sexual abuse⁴. Sexual abuse involves engaging children in activities (contact and non-contact) which are inappropriate for their age and maturity¹. Majority of children who have been physically abused present with: soft tissue injuries, thermal injuries as well as fractures. The commonest non-accidental injury to soft tissues is bruising¹². Abusive bruises tend to be found away from bony prominences, are large, multiple and occur in clusters and sometimes carry an imprint of the object used. Commonly affected sites include the head and neck, buttocks, trunk and arms⁴⁴.

Non-accidental burns do not always have distinguishing features except for a significantly increased risk of symmetrical burns^b. The absence of splash marks, finding of symmetrical burns and finding of burns which affect the buttocks and perineum are features that should prompt suspicion of non-accidental burns⁴³.

Non-accidental fractures indicate a serious assault to a child. The prevalence of non-accidental fractures is between 11 and 55% of physically abused children, depending on the age of the population studied. In a comparative study of patterns of fractures in accidental and non-accidental injuries, 80% of children with fractures from physical abuse were <18 months of age, whereas 85% of accidental fractures occurred in children over 5 years of age. The authors concluded that one child out of eight children under the age of 18 months who sustains a fracture may be a victim of abuse¹⁶.

WHO estimates that 150 million girls and 73 million boys under 18 years of age experienced forced sexual intercourse or other forms of sexual violence during the year 2002. Studies suggest that young children are at greatest risk of physical violence, while adolescents are at the greatest risk of sexual abuse¹⁷. Boys are at greater risk of physical violence than girls, while girls face greater risk of sexual violence¹⁷.

Outcomes from the Injuries

The consequences following accidents include physical, social, mental and economic disruptions besides deaths, disabilities and disfigurements. In a study by A. Tursz et al on home accidents, 38% of children left the emergency room without any prescription; ambulatory care was provided in 43% of the cases; 19% of the children were admitted into the hospital. Two deaths were recorded: one from suffocation in a child below 1 year of age; and one from a window fall in a child aged 17 months¹⁸. Factors influencing the hospitalization rate were the type of accident and the type of trauma lesions. The accidents and traumas responsible for admission to the hospital were: physical trauma (12%), burns (15%), concussion (15%) and poisoning (63%).

All cases of concussion were admitted, compared with 2% of bruises, or cuts and lacerations, and 48% of fractures. The average length of stay in hospital was 4.7 days (median: 2 days for all types of accidents, 3.0 days for physical trauma, 1 day for foreign bodies, 1 day for poisonings and 10.5 days for burns). Two patients were reported as having developed severe long-term disability.⁵

Child injuries have been neglected for many years, their prevention being largely absent in the global child survival initiatives¹. A large proportion of all injuries can be prevented, yet it is difficult to find any well planned control programmes under implementation⁷.

This study is undertaken with the aim of filling the knowledge gaps on the patterns and outcome of injuries in sub-Saharan Africa. Such knowledge may subsequently form the basis for the development of active prevention.

3.0 STUDY JUSTIFICATION AND OBJECTIVES

3.1 s t u d y j u s t i f i c a t i o n

Childhood injuries constitute a major public health concern and are a growing worldwide problem. Every year, approximately 830,000 children under the age of 18 years die as result of unintentional injury, and non fatal injuries affect lives of between 10 million to 30 million more children globally with 95% of these deaths and injuries occurring in low and middle income countries⁷. For many households, the loss is not just limited to the pain and suffering of the child, but ma\ cause death or disability which can be crippling both psychologically and financially. Injuries thus pose a huge drain on the resources of not only the health system but also of the society at large.

The home is a significant setting for a number of deaths and a large number of non fatal injuries. Preschool children are particularv vulnerable in the home enviroment not just because homes are inherently unsafe but because this is where these children spend most of their time. The success of some countries in reducing child mortality from injuries shows that many of these injuries and deaths can be prevented⁷.

Existing literature has reported mainly traffic and work related injuries in adults, but childhood home injuries remain poorly researched\ This study sought to determine the spectrum and short-term outcome of home-based injuries in children presenting to KNH. which information may be useful to quide care and formulation of preventive programs.

3.2 Study objectives

Primary objectives

- . To describe the spectrum of home based injuries among under 18 year old children presenting to Kenyatta National Hospital.

- . To determine the short-term clinical outcomes of under 18 year old children presenting to Kenyatta National hospital after being injured in the home.

Secondary objective

- To determine risk factors for unfavourable outcome among children presenting to Kenyatta national hospital with injuries sustained in the home.

4.0 MATERIALS AND METHODS

4.1 Study Design

This was a hospital based short longitudinal survey.

4.2 Study Site

This study was carried out in Kenyatta National Hospital which is the largest tertiary hospital in Kenya. It serves as a national referral and teaching hospital for the University of Nairobi. It is also the provincial hospital for Nairobi and serves approximately two million people in Nairobi. The study subjects were recruited from the accident and emergency department, paediatric emergency unit, paediatric wards, paediatric surgical wards, ophthalmology ward, burns ward, burns unit and the intensive care unit. Initial contact with injured patients was at the paediatric emergency unit and the accident and emergency unit. Depending on the severity of the injury, some patients are admitted while others are treated as outpatients. Patients with burns, falls, fractures and cuts are admitted in respective surgical wards. Those with poisoning, choking and suffocation are initially seen at the paediatric emergency unit and severe cases admitted to the paediatric wards.

4.3 Study Population

The study population comprised under eighteen year old children with injuries sustained in a home setting. The definition of a child was based on that given in the Convention on the Rights of the Child and the Children's Act 2001, Laws of Kenya and thus included individuals "under the age of 18 years"^{4 49}

4.4 Inclusion Criterion

Under eighteen year old children presenting at the Kenyatta National Hospital with home based injuries during the study period, for whom parental/guardian written informed consent and assent for study subjects above 10 years was given, were included into the study.

4.5 Exclusion Criteria

Study subjects for whom parental/guardian informed consent was not given, those with traffic related injuries and those with injuries sustained outside the home setting were excluded from the study.

4.6 Case definitions

Injury: Physical damage that results when a human body is suddenly or briefly subjected to intolerable levels of energy. It can be a bodily lesion resulting from acute exposure to energy in amounts that exceed the threshold of physiological tolerance, or it can be an impairment of function resulting from a lack of one or more vital elements (i.e. water, air, warmth), as in drowning, strangulation or freezing¹⁰. These injuries include burns, falls, poisonings, drowning, choking and suffocation, entrapments, cuts, fractures, bites, child abuse among others.

A *Child* is any individual aged less than 18 years. This is the definition of a child used in the Convention on the Rights of the Child and the Children's Act 2001. Laws of Kenya.^{4 49}

Short term outcome is outcome within the first month of injury and includes hospitalization versus no hospitalization, discharge versus prolonged hospital stay beyond one month, presence or absence of disability at one month and death versus survival.

Time of discharge in this study is the moment when the primary clinician makes the decision to discharge the patient from the hospital.

Home accidents are defined as those events occurring inside the home or in the immediate vicinity of the home that resulted in injury.

unfavorable outcome includes death, hospitalization, prolonged hospital stay beyond one month and disability.

Disability is any restriction or lack of ability (resulting from an impairment) to perform an activity in the manner or within the range considered normal for a human being.

4.7 Sample size calculation

The desired sample size was determined based on the second primary objective i.e. determination of proportion of children with unfavorable outcome.

$$n = \frac{Z^2 p(1-p)}{}$$

Where:

n = the desired minimum sample size.

Z = the standard normal deviation, set at 1.96. which corresponds to 95% confidence level.

P - Estimate for p was based on the study by A. Turzs et al at Paris in France where 48% of children presenting to hospital with fractures sustained at home were hospitalized⁴⁸. (No similar study has been done in a city in the developing world)

j = degree of accuracy desired, here set at 0.10.

In substitution.

$$n = \frac{Q^2 H(1 - 0.48)}{(0.01)}$$

(0.01):

Required sample size was a minimum of % children.

4.8 Sampling method

All eligible children under eighteen years who attended the accident and emergency department, paediatric emergency unit, paediatric wards, paediatric surgical wards, ophthalmology ward, burns ward and burns unit and the intensive care unit with a history of a home related injury during the study period were eligible for inclusion into the study. Demographic data was obtained during administration of the questionnaire.

4.9 Study procedures

Patient enrollment

The principal investigator and the research assistant who were trained clinicians visited the accident and emergency department, paediatric emergency unit, paediatric wards, paediatric surgical wards, ophthalmology ward, burns ward and burns unit and the intensive care unit and identified children who met the study criteria. Consent for participation in the study was sought from the guardians of eligible children. Assent was also sought from study subjects aged more than 10 years.

Recruitment into the study was done by the principal investigator and the research assistant from 0800hrs to 2300 hrs on all days of the week.

Patients admitted outside the time indicated were recruited from the respective wards within twenty eight hours of admission. Those presenting to A&E department outside study period and not hospitalised were traced via contacts in medical records and later recruited during scheduled reviews to maximise identification and inclusion into the study.

A brief history was taken to ascertain the place of occurrence of the injury before administration of the questionnaire

A predesigned questionnaire was applied in order to inquire from the guardian / parent and older child about sociodemographic properties of participants and circumstances surrounding the injury event and details on injury(ies) sustained by the patient.

Clinical assessment

A thorough focussed physical examination was conducted on every participant at enrollment and at discharge to assess the level of disability. Disability was classified based on International Classification of Functioning, Disability and Health. This is a WHO tool used in evaluation of disability. The level of impairment was quantified by the principal investigator and research assistant using a qualitative generic scale of one to five with a corresponding increase in severity. Moderate impairment was used as a reference and defined as up to half of the time or half the scale of having total restrictions or lack of ability. Other categories were then subsequently derived. (Table 1 and figure 1 below). A case record form included in the questionnaire was used to record relevant investigations done.

Table I: International Classification of Function, Disability and Health

No Impairment	None. Absent. Negligible	0-4%
Mild Impairment	Slight. Low	5-24%
Moderate Impairment	Medium. Fair	25-49%
Severe Impairment	High. Extreme	50-95%
Complete Impairment	Total	96-100%

None **Mild** **Moderate** **Severe** **Complete**

Figure 1: Generic scale for qualitative assessment of disability

Patient follow-up

Enrolled study subjects were followed up for a maximum of 30 days or until death or discharge whichever was shorter to ascertain the outcomes (length of hospital stay, disability or death).

A telephone contact was made at the 30th day to determine disability for those discharged before thirty days. All information was entered into data sheets.

4 10 Data management and analysis

The data was collected using a structured questionnaire and case record forms. A database was designed in MS Access. On completion of the data entry exercise, the data was exported in a SPSS Version 17.0 for analysis.

Data was summarised using means and medians for continuous variables such as age and duration of stay in the hospital. Categorical variables such as sex, age group, injuries and related factors were summarised by calculating the proportions.

The proportions were calculated within 95% confidence intervals and means, with standard deviations or medians with inter-quartile ranges, derived as appropriate to provide descriptive summaries of the data. Results were presented in descriptive form using frequency tables, pie charts, graphs and cross tabulation.

The association between various socio-demographic variables and unfavourable outcomes were tested independently using chi-square and Usher's exact test whenever a category had less than five subjects. Odds ratios and chi-square test for linear trend were used to determine significance.

11 Ethical considerations

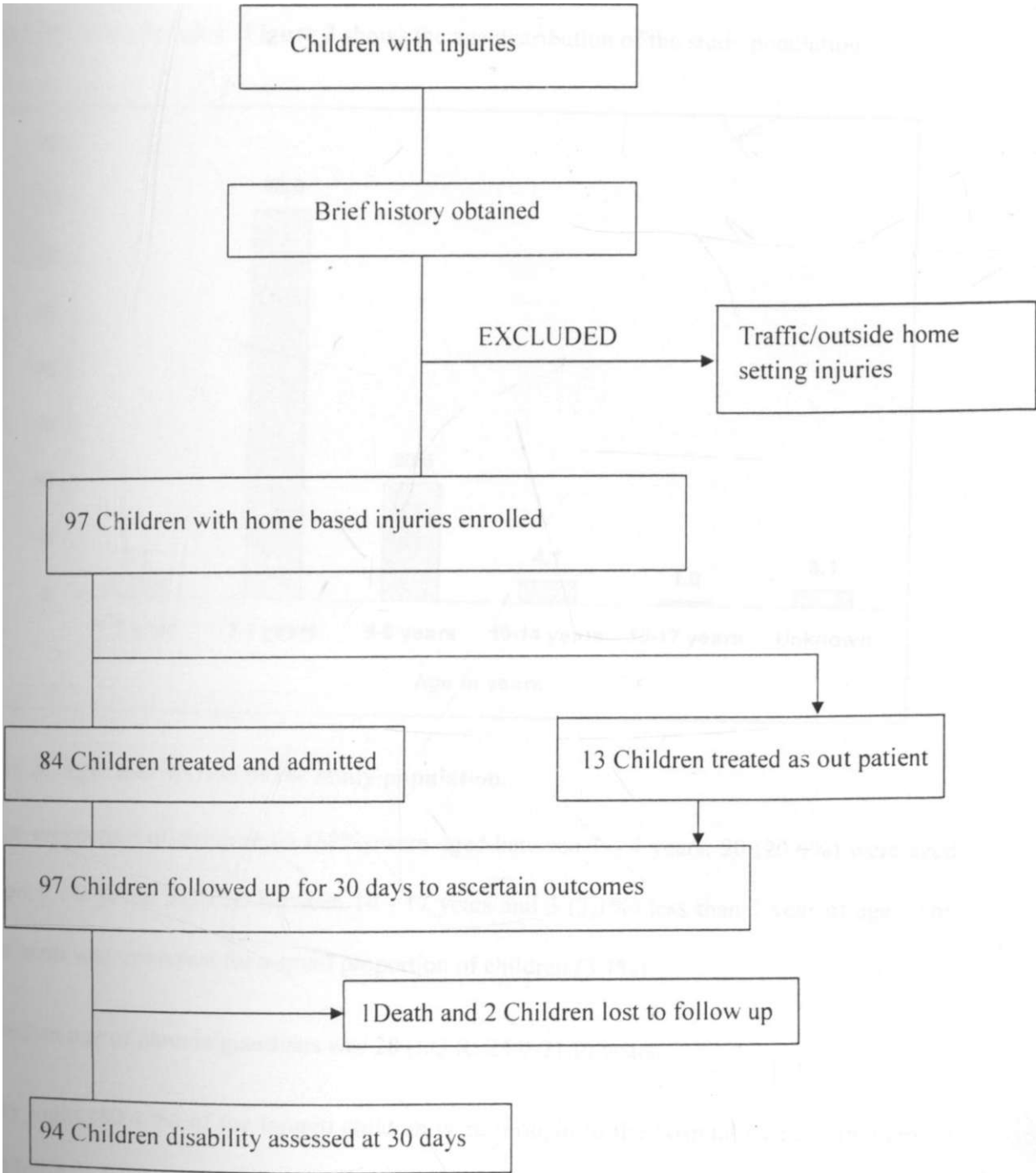
The study was designed to comply with international ethical guidelines and those of KNH and was carried out after approval by Department of paediatrics and Child health, University of Nairobi and KNH scientific research and ethics committee.

Informed consent was sought from parents/guardians of the injured child. An assent was also sought from the children aged 10 years and above. There was no extra cost incurred for participating in the study. Resuscitation and stabilization of the injured child were given priority over administration of the questionnaire. Questionnaires and case record forms were locked up in a secure place to ensure confidentiality of patient details. Only the investigator and research assistant had access to these data.

Patient's names and other identifying characteristics were not documented and records were encoded to ensure anonymity and confidentiality during data collection and reporting.

5.0 RESULTS

- 1 Patient enrolment and follow up is summarized in figure 2 below



2: Flow chart showing patient enrollment and follow up

- i Socio-demographic characteristics of study population

The median age of the study subjects was 2 years (I.Q.R: 1.5- 5.0). Males were 57 (58.8 %) and 40 (41.2%) were females. **Figure 3** shows the age distribution of the study population.

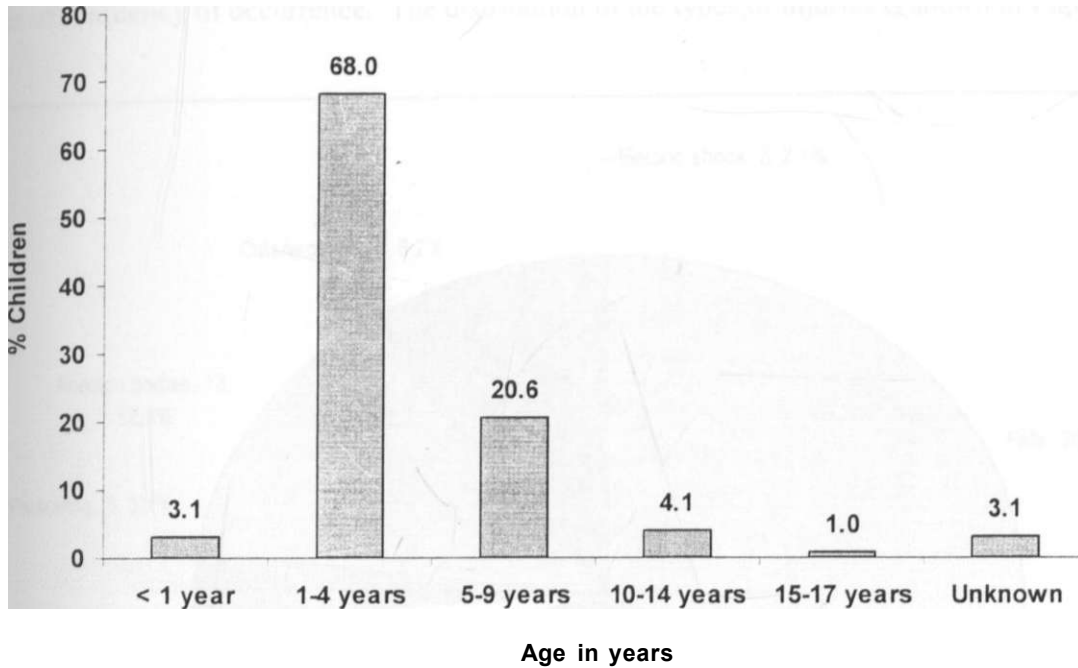


Figure 3: Age distribution of the study population.

A large proportion of children 66 (68%) were aged between 1 - 4 years, 20 (20.6%) were aged between 5 - 9 years, 5 (5.1%) between 10-17 years and 3 (3.1%) less than 1 year of age. The date of birth was unknown for a small proportion of children (3.1%).

The median age of parents/guardians was 28 (I.Q.R: 24.0-31.0) years.

Seventy eight (80.4 %) of the injured children were brought to the hospital by their mothers, 9 (9.3%) by their fathers, 3 (3.1%) by the aunts and 1 (1%) by the grandparents.

5.3 Cause and type of Injuries

Among the 97 children enrolled, falls were the commonest cause of injury **38(39.2%)** followed **by burns 34(33%)**. Other causes of injury included foreign bodies **12 (12.4 %)**, cut/wounds **8 (8.2%)**, poisoning **3 (3.1%)**, sexual assault **3(3.1%)**, electric shock **2 (2.1%)** and bites 1 (1%) in order of frequency of occurrence. The distribution of the types of injuries is shown in **Figure 4**

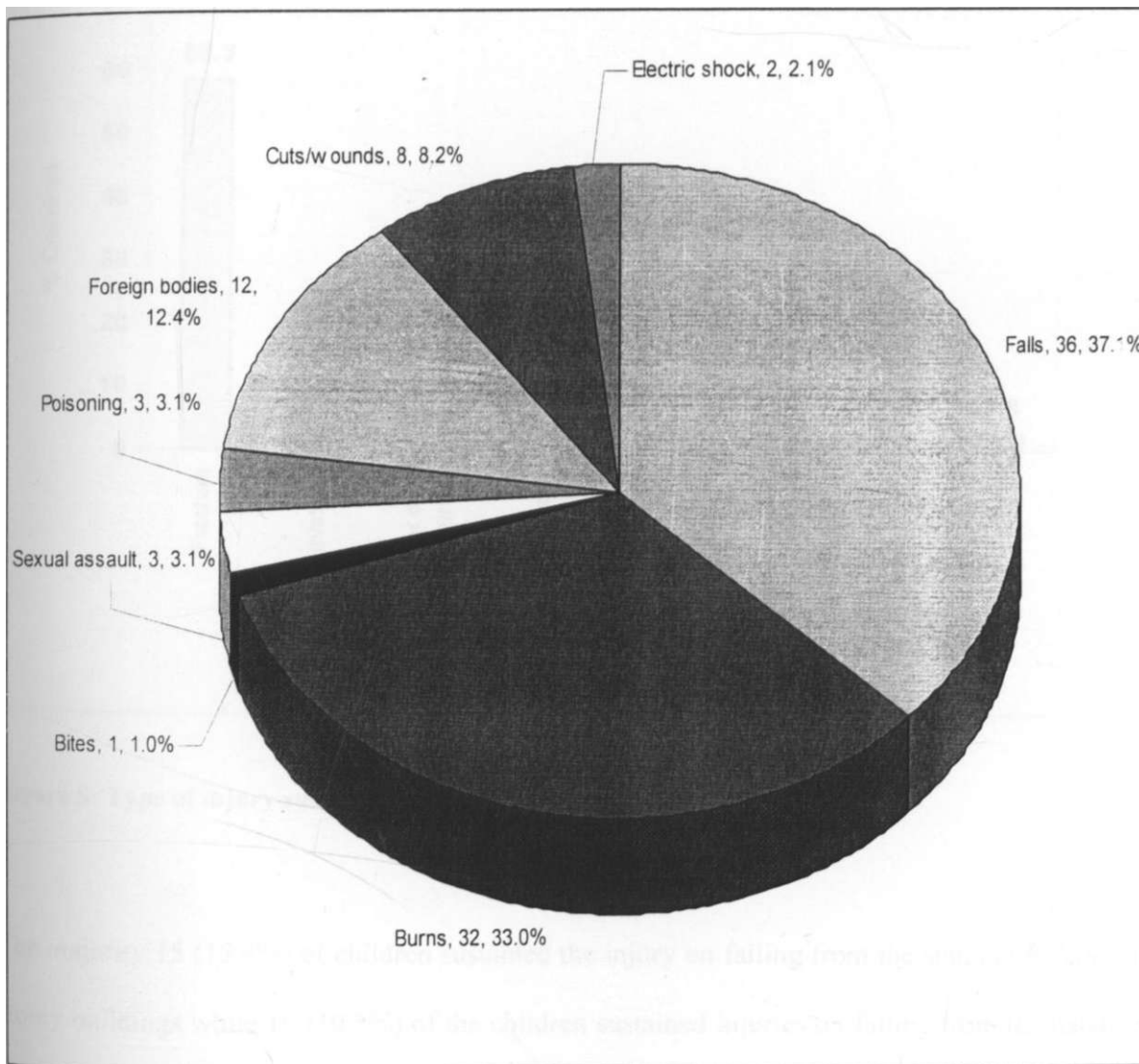


Figure 4: The distribution of the causes and types of injuries.

S.4 Spectrum of Injuries

Injuries sustained after falling

Fractures were the commonest type of injury sustained after falling (58.3%) followed by concussion/head injuries (11.1%) and fracture, cut and bruises (11.1%). Several patients sustained more than one type of injury. The distribution of the types of the injuries sustained after falls is shown in **figure 5** below

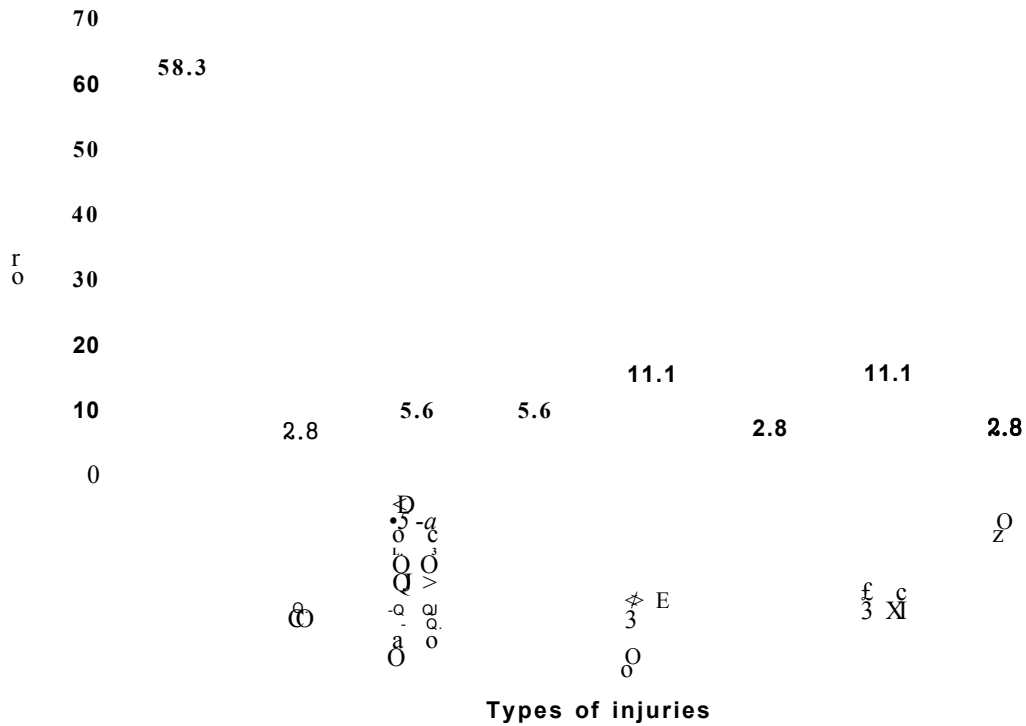


Figure 5: Type of injury sustained after falling

The majority 15 (15.4%) of children sustained the injury on falling from the stairs or balcony of storey buildings while 10 (10.3%) of the children sustained injuries on falling from the hands of the care giver. The median height of fall was 4.0 meters, the range being 1.0- 33 meters.

The spectrum of other injuries observed and their characteristics are shown in **Table 2a and 2b** below.

Table 2a: Spectrum and the characteristics of the injuries

Variable	N=97 (%)
FOREIGN BODY	
Type of foreign body	12 (12.4)
Organic	6 (50.0)
Non-organic	6 (50.0)
Location of foreign body	12 (12.4)
Airway	4 (33.3)
Nose	2 (16.8)
Gastrointestinal tract	1 (8.3)
Eyes	1 (8.3)
Ears	4 (33.3)
BURNS	
Cause of burns	32 (33.0)
Hot liquid, steam or other gas	27 (84.4)
Flames/fire	5 (15.6)

The frequency of organic and nonorganic types of foreign bodies was equal 6 (50.0%). Four children (33.3%) had foreign bodies located in the airway and the ears.

Hot liquids caused 27 (84.4%) of all burns while flames/fire caused 5 (15.6%).

table 2b: Spectrum and the characteristics of the injuries

POISONING	
Cause of poisoning	3 (3.1)
Solid/liquid toxin	2 (66.7)
Other	1 (33.3)
Place of contact with poison	3 (3.1)
Living room	1 (33.3)
Compound	2 (66.7)
CUTS AND WOUNDS*	
Type of cuts/wounds	8 (8.2)
Bruise	2 (25.0)
Incised wound	1 (12.5)
Lacerated wound	3 (37.5)
Crushed wound	2 (25.0)
Electric burns	2 (2.1)
Thermal burns	2 (2.1)
Cause of bites	1 (1.0)
Dog	1 (1.0)
Sexual assault	3 (3.1)

These children sustained cut/wounds not resulting from tails

Solids /liquids were the commonest cause of poisoning 2 (66.7%) with the compound being the commonest place of contact 2 (66.7%). There were 2 (2.1%) cases of thermal burns caused by electricity. Sexual assault and bites contributed 3(3.1%) and 1(1%) respectively.

5.5 Place of occurrence of injury and activity at the time of injury

The injuries occurred in various places as the child was engaged in various activities as shown in

Table 3.

A large proportion of injuries 29 (29.9%) occurred in the compound, the injuries occurring in the living room being 28 (26.8%).

Majority 64 (66%) of injuries occurred while the child was involved in leisure/play. Of the caretakers, 1% did not know the place of occurrence of the injuries while 2% did not know the activity of the child at time of injuries.

Table 3: Place of occurrence of injury and activity at the time of injury

Variable	N=97 (%)
Place where injury occurred	
Kitchen	14 (14.4)
Living room	26 (26.8)
Bedroom	6 (6.2)
Stairs/balcony	10 (10.3)
Compound	29 (29.9)
Others	11 (11.3)
Unknown	1 (1.0)
Activity of the child at time of injury	
Leisure/play	64 (66.0)
Vital activity	15 (15.5)
Unspecified	10 (10.3)
Other	6 (6.2)
Unknown	2 (2.1)

5.6 Distribution of how injuries occurred

The distribution of how the accidental injuries and the non accidental injuries occurred and the perpetrators of non accidental injuries are shown in **Table 4**.

Among 97 study subjects, 88 (90.7%) had accidental injuries. 4 (4.1%) sustained non accidental injuries and 5 (5.2%) of the respondents did not know how the injury occurred. The 3 of study subjects with injuries inflicted by a second person were sexually assaulted with strangers 2(2.1%) being the commonest perpetrators.

Table 4: Distribution of how injuries occurred

Variable	N=97 (%)
Accidental	88(90.7)
Non accidental	4(4.1)
Self inflicted	1 (1.0)
Inflicted by other	
• Stranger	2(2.1)
• Others (grand father)	1 (1.0)
Not known	5(5.2)

5.7 Child's caretakers' data at the time of injury

Child's caretaker's data at the time of the injury is shown in Table 5

The majority of caretakers 55 (56.7%) at the time of injury were mothers. Six (6.2%) of the caretakers were house helps, 3 (3.1%) of the injuries occurred in the absence of caretakers.

Forty three (44.3%) of the caretakers at the time of injury were housewives. The education level of the majority of the caretakers 51 (54.3%) at the time of injury was up to primary school.

The mean age of the caretaker at the time of injury was 27.0 (12.5) years.

Table 5: Child's caretakers data at the time of injury

Caretaker at the time of injury	
None	3(3.1)
Mother	55 (56.7)
Father	8(8.2)
Sister	5 (5.2)
Brother	3(3.1)
House help	6 (6.2)
Other	17(17.5)
Age of caretaker	27.0(12.5)*
Education level of caretaker	
None	10(10.6)
Primary	51 (54.3)
Secondary	19(20.2)
College/universil}	10(10.6)
Unknown	4(4.3)

*Mean (standard deviation)

5.8 Action taken before seeking treatment

The action taken after the occurrence of the injuries is shown in **Figure 6**.

Fifty four (55.7%) of the children were given first aid prior to seeking definitive treatment

Time taken before seeking treatment was a mean of 1.6 (0.9) hours.

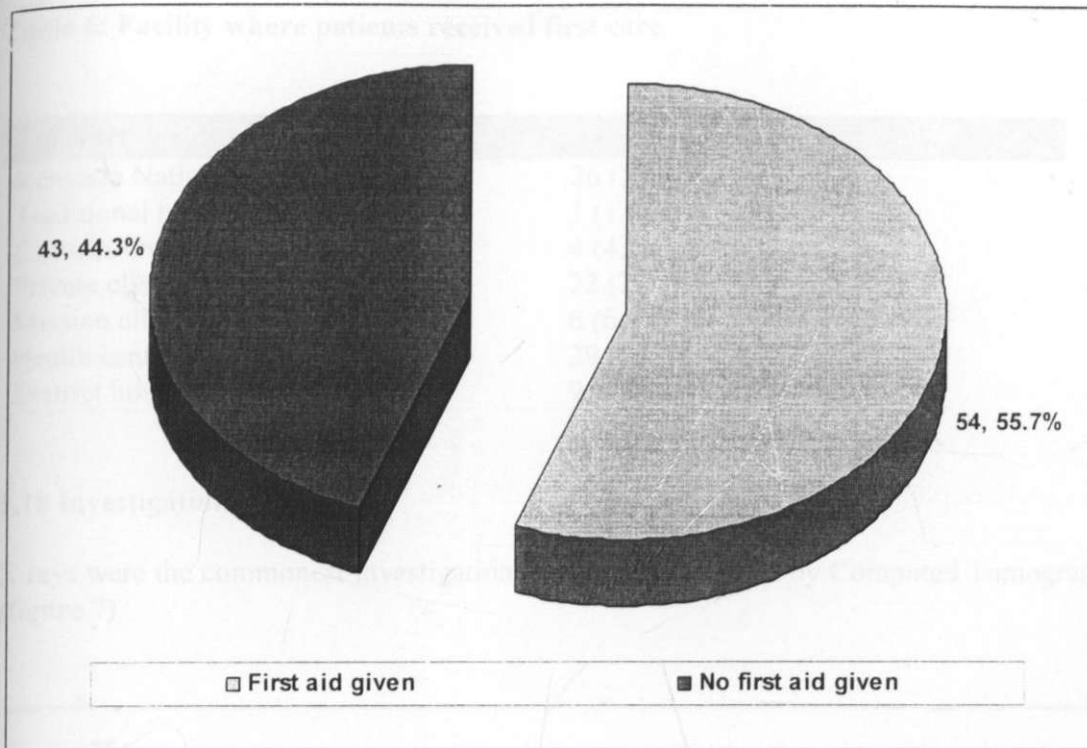


Figure 6: Action taken before seeking treatment.

5.9 Facility where patients received first care

The place where patients sought treatment first is summarized in **Table 6**.

Sixty six percent of patients had been treated in either a mission hospital or government run hospital and health centers before being referred to K.NI I

Twenty nine (29.9%) of the patients first sought health services in health centers. 22 (22.7%) in private clinics while 26(26.8%) sought services first at KNH. Only one patient acknowledged having sought services of a traditional herbalist.

Table 6: Facility where patients received first care

	n=97 (%)
Kenyatta National Hospital	20(20.8)
Traditional healer/Herbalist	1 (1.0)
Chemist/Over the counter drugs	4(4.1)
Private clinic/Hospital	22 (22.7)
Mission clinic/Hospital	6(6.2)
Health centre	29 (29.9)
District hospital/ <u>Provincial</u> hospital	9(9.3)

5.10 Investigations done

X rays were the commonest investigations performed followed by Computed Tomography scans (figure 7)

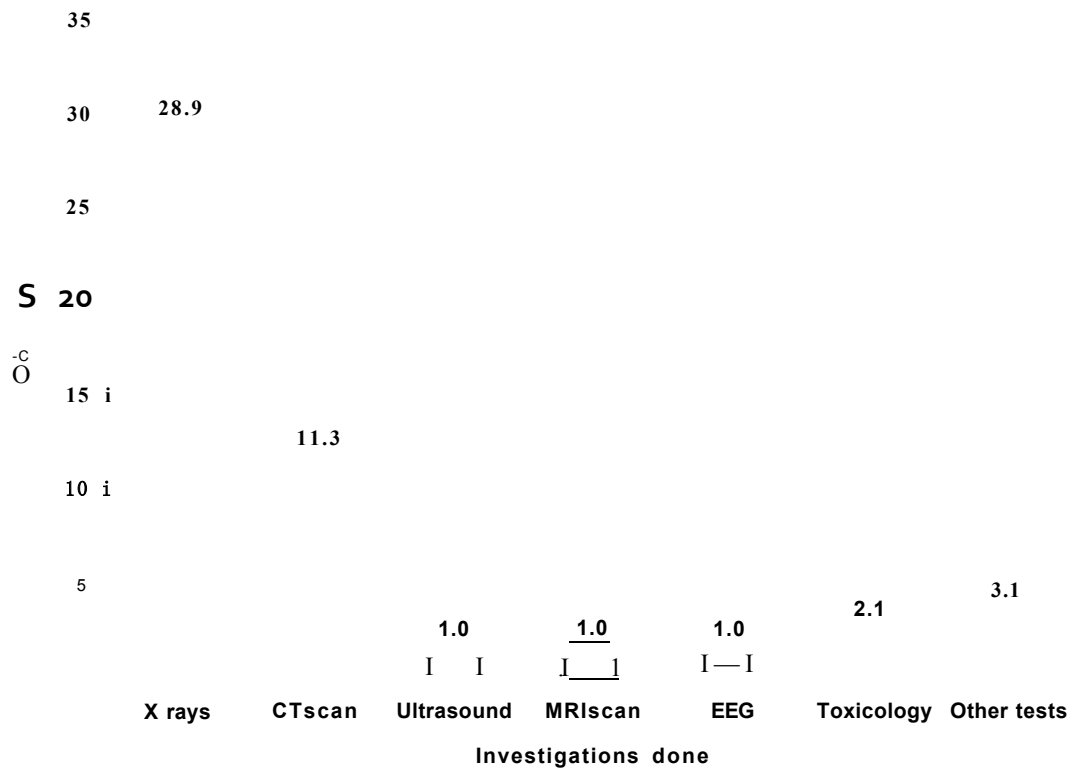


Figure 7: Investigations done.

5.12 ASSESSMENT OF DISABILITY

The majority of children with disability had an upper limb disability at both admission 40(41.2%) and at 30 days 17(17.5 %). This made upper limb disability the commonest disability resulting from the injuries. Various children had more than one form of disability as depicted in

Table 8 below.

Table 8: Type of disability incurred

Type of disability	On admission (n=63/96)	At 30 days (n=35/94)
Upper limb disability	40(41.2)	17(17.5)
Lower limb disability	11 (11.3)	8(8.2)
Hearing impairment	5(5.2)	1 (1.0)
Vision impairment	4(4.1)	1 (1.0)
Breathing difficulties	14(14.4)	0 (0.0)
Memory impairment	7(7.2)	3(3.1)
<u>Feeding</u> difficulties	14(14.4)	7(7.2)

Level of impairment

Table 9: Level of impairment

Level of impairment	Admission N=96 (%)	30 days N=94 (%)
No impairment	8(8.3)	36 (38.3)
Mild impairment	18(18.8)	32 (34.0)
Moderate impairment	42(43.8)	17(18.1)
Severe impairment	25 (26.0)	9(9.6)
Complete impairment	3(3.1)	0(0.0)
Total impaired	88(91.7)	58 (61.7)

The different levels of impairment are shown in **Table 9**. In the majority of the subjects at admission, the level of impairment was moderate 42 (43.8%) while severe impairment occurred in 25 (26.0%) of the cases. At 30 days 36 (38.3%) of the study subjects had no impairment while 32 (34.0%) of the study subjects had mild impairment mild impairment

5.13 Risk factors for Unfavorable Outcome

Association between child's and caretaker's characteristics and prolonged hospitalization

We sought to determine whether child's and caretaker characteristics at time of injury were a significant risk factor for long hospital stay more than 14 days. There was no significant association between selected caretaker's socio demographic characteristics and child's hospital stay ($P > 0.05$) as shown in **Table 10**.

Table 10: Child's hospitalization in relation to child's and caretaker's characteristics

Variables	Long stay (>14 days) (N=49)		Short stay (<= 14 days) (N=35)		OR (95% CI)	P value
	n	%	n	%		
Age group						
< 2 years	15	62.5	9	37.5	1.0(0.2 5.2)	0.954
2-5 years	26	56.5	20	43.5	0.8(0.2 3.3)	0.749
> 5 years	8	61.5	5	38.5	1.0	
Non response	0	0.0	0	100		
Sex of the injured						
Female	21	60.0	14	40.0	1.2(0.5-2.9)	0.639
Male	28	54.9	23	45.1	1.0	
Caretaker at injury						
None	0	0.0	0	100	Undefined	
Parent	34	59.6	23	40.4	1.1(0.4-3.1)	0.867
Other	15	57.7	11	42.3	1.0	
Type of dwelling						
Semi-permanent	22	61.1	14	38.9	1.6(0.4 -5.7)	0.441
Permanent	18	58.1	13	41.9	1.4(0.4-5.2)	0.588
Temporary	9	50.0	9	50.0	1.0	
Non response	0	0.0	1	100		
Education level of caretaker						
< Secondary	34	61.8	21	38.2	1.3(0.5 3.4)	0.612
> Secondary	18	56.3	14	43.8	1.0	
Non response	0	0.0	2	100		

UD-Undefined

The proportion of children hospitalized for more than 14 days was similar across age groups,

< 2 years (56.5%), 2-5 years (62.5%) and > 5 years (61.5%): $p > 0.05$.

female children had similar risk of hospitalization as male children; 60.0% versus 54.9%. $p=0.639$. Children under care of parents at the time of injury were at similar risk of prolonged hospitalization as those under care of others (59.6% compared to 57.7%) respectively $p=0.867$

Type of dwelling was not associated with prolonged hospitalization; temporary 50.0%. versus semi permanent. 61.1%. versus permanent structures 58.1% $p > 0.05$.

Similarly education level of caretaker was not significantly associated with prolonged hospitalization; primary 61.8% compared to > secondary 56.3% $p=0.612$.

Association between child's and caretakers characteristics and residual disability at 30 days

A similar inference was observed in the relationship between child's residual disability at 30 days and selected child's/care taker's characteristics. All characteristics were not significantly associated with child's residual disability at 30 days ($p > 0.05$) as shown in Table 11.

The proportion of children with residual disability at 30 days was similar across all age groups < 2 years (63.0%), 2-5 years (62.0%) and .5 years (60%): $p > 0.05$

Type of dwelling was not associated with residual disability; temporary (52.4%) versus semi permanent (56.8%) versus permanent structures (72.2%) $p > 0.05$

Female children (71.8%) were 2.12 [95% CI of OR - 0.81 - 5.61] times more likely to experience residual disability compared to their male counterparts (54.5%). The distribution difference was not statistically significant $p=0.093$

Education level of the caregiver was not associated with residual disability; primary (61.0%) and > secondary (65.5%) $p=0.682$.

Relationship between child's residual disability and child's caretaker at the point of injury was not statistically significant. However, there was a significantly high proportion of residual disability in children taken care by their parent(s) (69.4%) compared to those taken care by others (46.7%), **OR**- 2.59 [P=0.038. 95% CI= 1.05 - 6.35].

The likelihood of residual disability for those with no caretakers (50.0%) was 1.14 [P 0.0927, **95% CI**~ 0.07 - 20.02] compared to those taken care by others.

Table 11: Child's residual disability at 30 days in relation to caretaker characteristics

Variables	Residual disability (n=58)		No residual disability (n=36)		OR (95% C.I.)	P value
	n	%	n	%		
Age of the child						
<2 years	17	63.0	10	37.0	1.13 (0.31 -4.14)	0.850
2-5 years	31	62.0	19	38.0	1.09 (0.33 -3.54)	0.889
>5 years	9	60.0	6	40.0	1.00	
Non response	1	50.0	1	50.0		
Type of dwelling						
Temporary	11	52.4	10	47.6	0.42(0.14 - 1.30)	0.134
Semi-permanent	21	56.8	16	43.2	0.50(0.19 1.34)	0.170
Permanent	26	72.2	10	27.8	1.00	
Sex of the injured						
Female	28	71.8	11	28.2	2.12(0.81 5.61)	0.093
Male	30	54.5	25	45.5	1.00	
Caretaker at injury						
None	1	50.0	1	50.0	1.14(0.07 20.02)	0.927
Parent	43	69.4	19	30.6	2.59 (1.05 6.35)	0.038
Other	14	46.7	16	53.3	1.00	
Education level of caretaker						
< Secondary	36	61.0	23	39.0	0.82(0.33 2.08)	0.682
> Secondary	19	65.5	10	34.5	1.00	
<u>Non</u> response	1	50.0	3	50.0		

Note: The one study subject who died was not included in the analysis for unfavorable outcome because of some missing data.

6.0 Discussion

In this study there was a higher rate of injuries in boys as compared to girls. Fifty nine percent of the study subjects were males while 41.2% were females. The higher rate of accidents in boys is similar to previously reported data from studies in this field as reported by Makewa et al¹⁷, Hyder et al¹⁸ and Phelan et al²⁰. This male preponderance has been observed elsewhere and is thought to be due to the experimenting or adventurous nature of males as compared to females and hence the increased susceptibility⁷. The higher rate injuries in boys seems universal and our study findings are not an exception.

Most of the injuries 68.8% occurred in the 1-4 years age group while 20.6% were in the age group 5-9 years. This concurs with a study done in USA by Phelan et al who found that the rates of injuries in children less than 1 year and 1-4 years to be significantly higher than children older than 5 years but differed with the rates observed by Makewa et al; 40.4% among children aged 0-4 years^{17,20}. This can be explained by the fact that Makewa et al included road traffic accidents whose prevalence is higher in the older child. This susceptibility of the 1-4 year olds to accidents is due to their physical and intellectual immaturity which impairs judgment and reaction to dangerous situations⁷.

The second important finding in our study was that fall related injuries were the commonest type of accident accounting for 37.1%. Falls in previous studies have been found to be the leading causes of injuries in children in Kenya and around the world⁷. A community study in Baringo Kenya reported a similar prevalence of falls, 27% of all accidents while Thein et al in a community based study in Singapore reported a different prevalence. 77% of all injuries¹⁹.

Our data also showed that the commonest age group involved in falls was the 1-4 year age group accounting for 45.9%. This is probably due to the fact that children in this age group are more prone to accidental falls due to the developmental stage. In other studies on average more than 50% of fall related injuries have been reported among children under 5 years' ⁷.

The majority 15 (15.4%) of children sustained falls from the stairs or balconies followed by 10 (10.3%) who fell from the hands of a care giver. Gaspar showed that 13.8% of falls occurred from buildings or other structures. 1.7% from stairs while falls from the lap were 10.5% The median height of fall was 4.0 meters in this study, the range being 1.0- 3.3 meters and is similar to that by Bulut et al in Turkey that found the mean height of fall to be 3.8(3) meters². There were two instances of children falling from 4th and 5th floors of high-rise flats through windows that were not fitted with iron grills, and this could explained the long range we found in our study.

Local studies have shown burns to constitute between 16- 37% of all injuries in children¹ and the finding of 33% in this study concurs. All burns were reported in the age group 1-4years in our study, which compares closely with Makewa et al who found burns to commonly occur in the age group 0-4 years, accounting for 85% of all children with burns.' Scalds were the commonest types accounting for 84.3% of burns, a similar rate of 84.9% was reported by Ndiritu et al among children below 5 years at KNH in 2006². A slightly lower rate of 64.4% was found in a study in Maiduguri, north-east Nigeria¹ Burns are a type of injury that predominantly occurs at home, especially in the kitchen and mainly affects children 1-4 years of age. Routine process of cooking and bathing are often the culprits and hence the high rate of scalds.

We established that 29.9% of the children had accidents in the compound. 26.8% in the living room and 14.4% in the kitchen. Majority (66%) of the children were involved in play at the time of injury followed by vital activities 15.5%. This concurs with a study done by Hyder et al where 63% of injuries occurred mainly when children were at play, while only 9% took place during vital activities of daily living.¹⁰ That the compound and the living room are common venues for injuries may be related to the presence of several risk factors in the compound where Kenyan children spend most of their time playing and in the living room where vital activities like feeding take place. In a Turkish city based study. 38.6% of children had accidents in the living room and 19.3% in the kitchen while an Iranian urban based study found that more than half (58%) of the injuries occurred in the living room, dining room or bedroom. However. 19% occurred outdoors in the compound. The kitchen in our study was the 3rd most common place for an injury to occur a finding which is comparable to what is reported by WHO/UNICEF world report on injuries.⁷

The third most important finding was that accidental injuries occurred in 90.7% of the study subjects while 4.1% had non accidental injuries. Of the non accidental injuries 3.1% had sexual assault related injuries with strangers being the common perpetrators. This probably is an underestimate of sexual assault as the patient enrollment did not include the patient support centre where the abused children are usually treated. Despite this low prevalence, sexual assault seems to be a striking feature of injury in KNH and thus more studies need to be carried out.

The fourth most important finding was that 84(86.6%) of our study subjects were treated and admitted while 13(13.4%) were managed as outpatients. In contrast to our study findings, Tursz et al in Paris France, found 19% of children requiring hospitalisation¹⁸.

The skewed picture to admissions found in our study would be explained by the fact that KNH handles the bulk of referral cases in the country and hence likely to receive severe cases of injuries. Actually from our study data, 66% of patients had been treated in either a mission hospital or government run hospital and health centers before being referred to KNH. Only 26% of patients were first seen in KNH and only one patient had sought services of a traditional herbalist. This emphasizes the need for the government to strengthen the primary and secondary health care centers in the country. The median duration of stay to discharge was 13 days (5.5-28), this is unlike the study by Tursz et al who found an average length of stay in hospital to be 4.7 days⁴⁸. In Tursz's study the overall severity of injuries was reported as mild, in contrast to our study in which it was severe, and this could explain the longer duration of hospitalization observed in our study.

The fifth major finding was that a total of 88 (91.7%) had disability at admission compared to 58 (61.7%) at 30 days. This high level of disability at 30 days can be explained by high numbers of severe cases enrolled. On the other hand, the follow up period for assessment of disability was 30 days and probably this might be a short time period for disability assessment. We could not compare the levels of disability with other studies whose follow up was longer, ranging from 6 months to one year. The results of our study lead us to recommend another study to be conducted assessing disability for a longer period of time.

The major strength of this study is that it is probably the first outcome study on home based injuries to be conducted in the developing world. The second strength is the fact that being a longitudinal study incorporating a follow up period of 30 days ensured a comprehensive data package. The follow up period was thirty days and thus may have underestimated or overestimated the level of long-term disability thus contributing to its main weakness.

The results of our study have significant public health implications. The frequency, morbidity and possible disability caused by home injuries to children justifies development of possible preventive measures and evaluation of longterm consequences. The success of some countries like Singapore, in reducing child morbidity and mortality from injuries through preventive measures shows that many of these injuries and deaths can be prevented⁷.

7.0 CONCLUSION

The spectrum of home based injuries among children presenting to KNH in descending frequency included: injuries resulting from falls 37.1% (fractures 58.3%, concussion/head injury 11.1% among others), burns 33.0% (scalds 84.4% and flames 15.6%), foreign bodies 12.4% (organic 50% and non organic 50%), cuts and wounds 8.2%. poisoning 3.1%, sexual assault 3.1%. electric shock 2.1 % and bites 1.0%.

The short term clinical outcomes among children under 18 years presenting to KNH with home-based injuries. 86.6% were hospitalized and 50.5% had a prolonged hospitalization for more than 14 days. Mortality was rare occurring in one child: however residual disability at 30 days after injury was common, occurring in 61.7% of children.

There was no significant risk factors for unfavorable outcomes (length of hospital stay, residual disability) found in our study population.

8.0 RECOMMENDATIONS

The frequency, morbidity and possible disability caused by home injuries to children justifies development of possible preventive measures and evaluation of longterm consequences.

Since most of the injuries were related to falls, information and education of caregivers should focus on child's supervision and education on young children normal psychological and motor development.

9.0 Study limitations

The failure of the study to fully include all children presenting to the accident and emergency 24 hours a day may have lead to underestimation of frequency and missing of injuries that occurred at night. The follow up period was thirty days and thus may have underestimated or overestimated the level of long-term disability.

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APPENDICES

Appendix 1: PATIENT DATA COLLECTION FORM

1. Study number. Date (DD/MM/YY). . . . / /

2. I.P. No

3. Date of Birth (DD/MM/YY). . . . / / Age of study subject

4. Date of Birth of Parent/Guardian . . . / / Age of Parent/Guardian

5. Relationship to child:

	Mother	●	Grandparent	●
	Father	●	Neighbor	●
	Aunt	●	Sibling	●
	Uncle	●	Other (specify)	

5. Telephone contact

6. Residence (village/estate)

7. Type of dwelling:

- (1) Temporary •
- (2) Semi-permanent •
- (3) Permanent

Number of habitable rooms including the kitchen

8. How many people live in this household and what are their ages, sexes and occupations?

Household member number	Date of birth	Sex	Occupation
01 (Senior female)			
02			
03			
04			

Sex of the injured person:

(1) Male •

(2) Female •

10. Age at the time of injury (yrs). (Mths)

11. Date of occurrence of the accident (DD/MM/YY)...../...../...../

12. Time of accident: (OOOOhrs to 2400hrs)

13. Day of occurrence of the accident:

(1) Monday •

(5) Friday •

(2) Tuesday •

(6) Saturday •

(3) Wednesday •

(7) Sunday •

(4) Thursday •

14. What caused the person's injury?

(a) Falls

I. From what height did the injured person fall from? (Estimate height in meters)

II. From where did the injured person fall when he/ she were hurt?

(1) Stairs |~j

(2) Furniture •

(3) Tree j-j

(4) Hands of caregiver Q

(5) Roof •

(6) Balcony •

(7) Others specify

(b)Foreign bodies

I. How did the foreign body enter the child's body?

- (1) Swallowing.
- (2) Insertion.
- (3) Traumatic force.
- (4) Inhalation •
- (5) Aspiration

II. Type of foreign body ingested.

- (1) Organic (peanut, beans, vegetable material)
- (2) Non organic (toys, dental prosthesis, needles coins)

III. Location of foreign body.

- (1) Airway •
- (2) Nasal •
- (3) Gastrointestinal ●
- (4) Byes •
- (5) Ears •

(c)Burns

1. What caused the burn that the injured person sustained?

- (1) Contact with a hot liquid, steam or other gas
- (2) Contact with a hot object or solid substance (e.g. cooker, kettle.
Stove, iron)
- (3) Contact with flames/fire
- (4) Inhalation of smoke from burning object/substance
- (5) Gas explosion

(d)Poisoning

I. Describe what the injured person came in contact with that caused the poisoning injury

- (1) A drug or medical substance used mistakenly or in overdose
- (2) A solid or liquid toxin (e.g. pesticides, household cleaning products, rat poison—hydrocarbons)
- (3) Inhaling gases or vapors O
- (4) Eating a poisonous plant or the substance mistaken for food
- (5) A venomous animal
- (6) Others (specify)

II. Where did the injured person obtain or come in contact with the product that caused the poisoning.

- (1) Kitchen (6) others (specify)
- (2) Living room ●
- (3) Bedroom ●
- (4) Stairs ●
- (5) Compound ●

(e)Drowning and near drowning

I. What was the injured person doing when he/ she drowned or nearly drowned?

- (1) Bathing ●
- (2) Swimming/playing ●
- (3) Collecting water ●
- (4) Fishing ●
- (5) Travelling by foot ●
- (6) Travelling by boat ●

II. What body of water was involved in the drowning incident?

- (1) Well ●
- (2) Pond near your home ●
- (0) Ditch near your home ●
- (4) River of lake ●
- (5) Bay. ocean, sea ●
- (6) Flood water ●
- (7) Swimming pool ●
- (8) Bathtub ●

(f)Animal bites/ stings

I. What caused the persons bite?

- (1) Human bite
- (2) Snakes
- (2) Dog •
- (3) Cat
- (3) Spider ' (5) Ticks and mite bites
- (6) Insect bites (7) Other animals (specify)

II. What caused the persons sting injury?

- (1) Bee sting Q
- (2) Wasp •
- (3) Ant stings - •
- (4) Marine animal stings
- (5) Scorpion stings ●
- (6) Others (specify)

(g) Electric shock injury

I. What caused the electric shock injury?

- (1) Accidental contact with exposed parts of electrical appliance or wiring.
- (2) Flashing of electric arcs from high voltage power lines
- (3) Lightning
- (4) Machinery or occupational related exposures
- (5) Biting or chewing electric cords or poking metal objects into electric outlets.

II. How did the electric current cause the injury?

- (1) Thermal burns from contact with electric source
- (2) Muscle, nerve and tissue destruction from current passing through the body
- (3) Cardiac arrest

(h) Cut Aounds

I. Type of cut/wound as a result of the injury

- (1) Bruise
- (2) Incised wound
- (3) Lacerated wound
- (4) Crushed wound

15. Child's caretaker at time of accident:

- | | |
|----------------------------------------------|-----------------------------------------|
| (1) None <input checked="" type="radio"/> | (2) Mother <input type="checkbox"/> |
| (3) Father <input checked="" type="radio"/> | (6) Sister <input type="checkbox"/> |
| (7) Brother <input checked="" type="radio"/> | (8) House help <input type="checkbox"/> |
| (9) Others (specify) | |

Age of the caretaker at the time of injury in years

17. Education level of the caretaker.

- (1) None Q
- (2) Primary school
- (3) High school •
- (4) Post- secondary •
- (5) College/University

18. Current occupation of the caretaker at the time of injury.

- (1) Farmer Q
- (2) Self-employed: Low income Q
- (3) Salaried • O Middle income Q
- (4) Student •
- (5) Housewife •
- (5) Others (specify)

19. Where was the injured person when the injury occurred?

- (1) Kitchen dl others (specify)
- (2) Living room
- (3) Bedroom •
- (4) Stairs D
- (5) Compound

20. What was the victim doing at the time of the injury?

- (1) Leisure/play •
- (2) Vital activity (i.e. sleeping, eating, washing) •
- (3) Unspecified activities (hanging around, doing nothing) •
- (4) Other (specify) •

21. How did the injury happen? Was it an accident, did someone else do this to the injured Person, or did the injured person do this to him/herself?

- (1) It was an accident (unintentional) •
- (2) Someone else did it to me deliberately (intentional) •

(3) I did it to myself deliberately (self-inflicted)

(4) Don't know

22. The relationship of the perpetrator to the victim.

(1) Parent d

(2) Child's sibling (brother, sister)

(3) Unrelated caregiver ●

(4) Stranger

(5) Official or legal authorities • Q

(6) Other relative (specify)

(7) Others (specify)

23. What injuries did the injured person sustain?

(1) Fracture • (2) Sprain/ Strain

(3) Cut, bite or other open wound • (4) Dislocation

(5) Bruise or superficial injury • (6) Poisoning

(7) Concussion/head injury • (8) Burn

(9) Cut, bite or other open wound •

(10) Internal injury/internal organ injury •

(11) Other (specify) _____

24. What part of the body was injured?

(1) Head ● (2) Face ●

(3) Neck ● (4) Chest ●

(5) Abdomen ● (6) Lower Extremity ●

(7) Upper extremity (except hand) ● (8) Hand ●

(9) Spine ● (10) Genitalia ●

25. Did anyone try to help the injured person by giving first aid?

- (1) Yes •
- (2) No •

26. Time taken after accident before seeking medical attention.

- (1) Less than 1 hour ●
- (2) 1-12 hours ●
- (3) 12-24 hour ●
- (4) More than 24 hours ●

27. How did the injured person get to the health facility for treatment of his/her injuries?

- (1) By foot O (6) By ambulance
- (2) By private car • (7) other (specify)
- (3) By taxi •
- (4) By public transport •

28. Where did the patient receive care prior to arriving at KNH?

- (1) Not applicable •
- (2) Traditional healer/herbalist •
- (3) Chemist/ over the counter drugs •
- (4) Private clinic/hospital •
- (5) Mission clinic/hospital •
- (6) Health center •
- (7) District hospital •
- (8) Provincial General Hospital •
- (9) Others (Specify) _____

29. Type of relevant investigation carried out.

- (1) X-rays Skull] Spine • Limbs Q Abdominal
- (2) CT scan Head CH Spine • Chest Q Abdominal
- (3) Ultrasound Cranial [[] Chest • Abdominal
- (4) MRI scan Head 1 1 Spine •
- (5) EEG
- (6) Toxicology (poisoning cases)
- (7) Others

State briefly the findings of the investigations in Question 28 above.

30. What was the condition of the patient on arrival to hospital?

- (1) Alive •
- (2) Dead •

31. If dead, place of death.

- (1) Accident scene ●
- (2) During transit to hospital ●
- (3) Not known ●

32. Outcomes:

- (1) Treated as an outpatient and discharged home •
- (2) Treated as an outpatient, revisit scheduled •
- (3) Treated and admitted •

33. Outcomes of the admitted:

- (1) **Date of admission**/...../.....(Dd/mm/yy) •
- (2) Date of discharge..... /..... (Dd /mm/yy) •
- (3) Date of death /..... /..... (Dd/ mm/yy) •
- (4) Date of going home..... /..... (Dd/ mm/yy) •
- Length of stay to discharge.....days
- Length of stay to going home.....days

34. Outcome on going home:

- (0) Alive and well •
- (2) Alive, partially recovered
- (3) Died ●
- (4) Discharged against medical advice ●
- (5) Absconded ●

Time of death of the victim in relation to when the injury occurred. (Duration in hoi

In what ways was the injured person physically disabled?	Admission	30 days
(1) Unable to use hand or arm	●	●
(2) Difficulty using hand or arm	●	●
(3) Walk with a limp		●
(4) Loss of hearing	●	●
(5) Loss of vision	●	●
(6) Weakness or shortness of breath	●	●
(7) Inability to remember things	•	●
(8) Inability to chew food	●	●

APPENDIX 2: CONSENT FORM

I **Dr Patrick (VL Mburugu** of the Department of Paediatrics and Child Health University of Nairobi am conducting a study on the spectrum and short term outcomes of children with home based injuries presenting to Kenyatta National Hospital. Home injuries are a major contribution to deaths and hospitalization in children. When compiled together the information will be useful to us in planning intervention measures and monitoring progress in health care provision. Answers to questions asked will be filled in a questionnaire. A full physical clinical examination will then be done. A case record form will be used to record findings of relevant investigations. A follow up telephone call will be made to the parent/guardian one month after the injury to ascertain outcomes. The information you give and results from investigations shall be treated with strict confidence and used only for the study and your child's care. Any useful information and results for her/his treatment shall be communicated to the attending doctors. You may opt not to participate in the study and the treatment and care of your child will not be altered in any way.

If you wish your child to take part in this study please acknowledge.

I....., who is the parent /guardian of the child..... is giving permission of the above study procedure to be carried out on my child. I acknowledge that a thorough explanation of the study procedure to which am consenting to has been explained to me by Dr

I clearly understand that my participation is completely voluntary.

Parent/Guardian signature: Date:

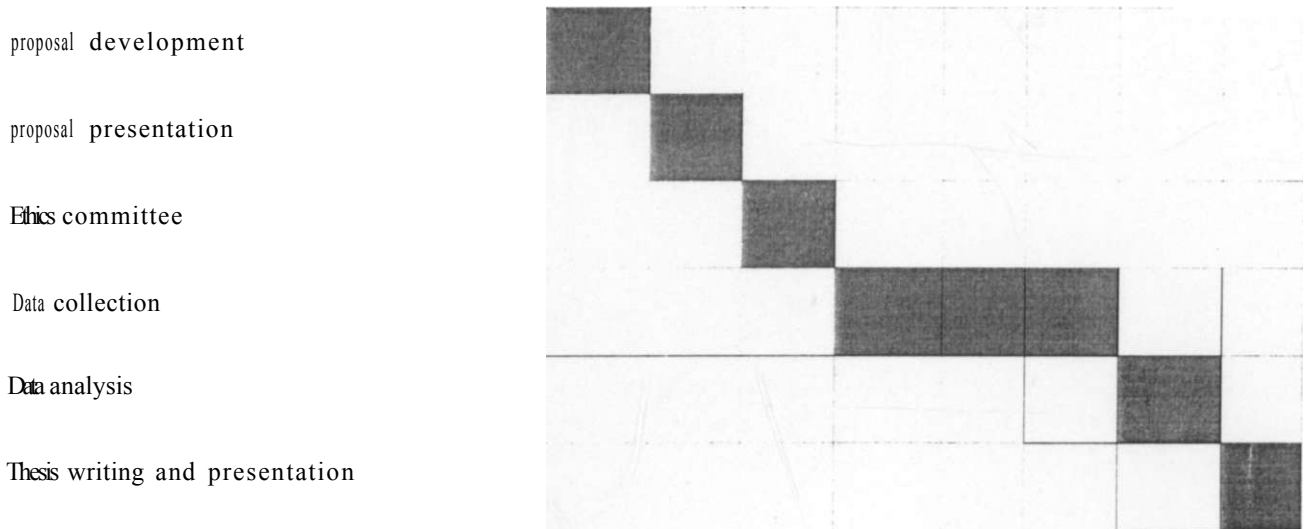
Doctors signature: Date:

APPENDIX 3

TIMELINES

JvITY

**MAY JUN JUL AUG SEP OCT NOV/ JAN
DEC**



BUDGET

ITEM	COST(KSh)
Transport' accommodation / food	20,000.00
Research assistance	30,000.00
Data typing/printing	20,000.00
Data analysis	15,000.00
Ethics committee	1,000.00
Total	86,000.00